

Fire Departments, Fire Apparatus, and
Fire Escapes.

A REPORT

ON THE MEANS OF PREVENTING THE LOSS OF
LIFE AND PROPERTY BY FIRE.

BY

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REPORT

On the methods employed for extinguishing and preventing the spread of fires, and on the different Fire Escapes adopted in several American cities.

CITY ENGINEER'S OFFICE, HALIFAX,
14th May, 1883.

TO HIS WORSHIP THE MAYOR AND CITY COUNCIL.

Gentlemen:—

While engaged in inspecting the different kinds of Graving Docks along the Atlantic coast of America, the following extract from the minutes of the City Council, dated 29th November, 1882, reached me in New York on the 5th December:

"*Resolved*, That His Worship the Mayor be requested to communicate forthwith with the City Engineer, requiring him to inform himself upon the various modes adopted—in the principal cities he may visit—for the prevention of accidents by fire and the most improved fire escapes adapted to public and other buildings for the preservation of life."

After receiving the above instructions, I called upon the heads of the fire departments at New York, Brooklyn, Philadelphia, Baltimore and Washington, and was in every instance received with courtesy by these gentlemen, who cheerfully answered all my questions and put me in the way of acquiring such further information as I desired.

NEW YORK.

The fire department employs in round numbers 1000 men and 230 horses, and costs annually about \$1,250,000, not including appropriations for new buildings, which would add about \$250,000 to the yearly cost. Of the 1000 men employed about 800 are effective firemen, who are divided into 66 companies of about 12 men to each company.

**Cost of Fire
Department.**

Alarm Stations & plugs Within the district under the control of the department there are over 700 fire alarm stations and about 7000 plugs or fire hydrants, varying from about 150 feet apart in the city to 600 feet apart in the outskirts.

Apparatus. One company operates a marine steam fire engine.

The apparatus consists of 58 steam fire engines, drawn by horses, 5 self-propelling steam fire engines, 52 hose tenders, 1 water tower, 24 hook and ladder trucks, 10 chemical fire engines, 14 fuel waggon, 1 wrecking truck, 119 chemical fire extinguishers, 5 hand engines, 2 hose carriages, 17 hose jumpers, 4 aerial or extension ladders, and 1 supply waggon.

Hose. The hose tenders or reels carry about 750 lineal feet of hose each.

The total length of serviceable hose is a little over 94,000 feet of the following brands:—

Rubber hose	36,500 feet.
Eureka Cotton hose	26,000 "
Baker " "	22,250 "
Boyd's " "	5,200 "
Red Cross " "	800 single ply.
Linen lined "	2,250 "
" unlined "	1,100 "

Total.....94,100

Organization The department is organized in the following manner:—
38 companies are each equipped with a steam fire engine drawn by two horses, and a tender drawn by one horse. One of these companies mans and operates the water tower, which is a tube in sections drawn on a carriage constructed for the purpose, with the necessary gearing for handling and controlling the tower in any position. (The tower can be used vertically up to a height of 50 feet, or it can be canted to any angle. From one to four engines can be connected at the base and thus a powerful jet of water from 2 to 3 inches in diameter can be injected into windows at a high elevation, which the firemen on many occasions could not otherwise possibly approach.

3 companies are each equipped with a steam fire engine drawn by 2 horses, and a tender drawn by 2 horses.

1 company is equipped with a steam fire engine drawn by 2 horses, a tender drawn by 1 horse and a hook and ladder truck drawn by 2 horses.

1 company is equipped with a self-propelling steam fire engine and a tender drawn by 1 horse.

1 company is equipped with a chemical fire engine drawn by 2 horses.

14 hook and ladder companies are each equipped with a truck drawn by 2 horses.

3 hook and ladder companies are each equipped with a truck drawn by 2 horses, and a chemical engine drawn by 1 horse.

1 company is equipped with a truck drawn by 2 horses, a chemical engine drawn by 2 horses and a tender drawn by 1 horse.

On a series of trials made to ascertain the time it would take to collect the men, hitch the horses to the different appliances above enumerated and to get everything ready for a start to a fire, it was found that the average time for the whole department was 7.25 seconds, the quickest being 2.20, and the slowest 15.33 seconds.

Time to collect force.

"The water tower or portable stand pipe is an appliance for elevating and directing streams of water into upper stories of high buildings. It consists of carriage and platform, with 4 sections of iron pipe, with couplings, play pipes, 6 nozzles from 1½ inch to 2½ inches diameter, and four 2½ inch inlets to receive the water. The first or lower section of the pipe is mounted on the platform permanently on trunnions, the other 3 sections are carried on a side rack." The first section is 14 ft. 6 inches in length, the second 12 feet, the third 19 feet and the fourth 5 feet 3 inches. These sections have not necessarily to be coupled together in the order here given.

Water Tower

On the first alarm of fire being given 5 companies turn out with 3 steam fire engines, ladders, and other appliances. On the second alarm 4 more engines and 2 hook and ladder companies respond. At the third alarm 4 additional engine companies are called out.

Attendance at Fires.

The captains of companies are required to familiarize themselves with all buildings in their company districts, and to make regular and periodical examinations of all churches, hotels, factories, warehouses, theatres, stores and all other buildings used for purposes of business, instruction or amusement, and to keep in their quarters written descriptions and drawings of all such buildings. They are also required to report all dangerous places where fire works or kerosene oils are sold without permission. They are empowered "at any time to enter into and examine all buildings, livery and other stables, hay boats or vessels and places where any merchandise, gunpowder, hemp, flax, tow, hay, rushes, fire wood, boards, shingles, shavings or other combustible materials may be lodged," in order to see that the municipal laws are rigidly enforced for the protection of the public against the risks of fire.

Duties of Commanding Officers.

Penalty for neglecting fires.

A fine of \$5 is exacted from any person using a chimney or flue which may take fire through carelessness or neglect to prevent the same from becoming foul.

Drill.

The firemen are drilled as frequently as possible in the use of the various ladders and appliances with which they are expected to be familiar.

Ladders.

There are 4 Bangor extension ladders in the department, the longest of which is capable of being elevated to a height of 73 feet. As many of the buildings considerably exceed this height, the firemen depend upon their scaling ladders to reach the higher stories when access cannot be had to the building in any other way. These are short light ladders with a large hook at one end. A fireman standing upon any projection or sill, at any height, can hook the ladder over the sill of the next nearest window above him and thus with slight assistance and without much difficulty pass from one story to another.

Common ladders and scaling ladders are, as a rule, said to be used in preference to the extension ladders, as they are found to be quicker and more easily operated, and the Chief Engineer of the department recommends their use in all ordinary cases.

The Bangor extension ladder to be promptly and properly handled, requires about 12 men well drilled in its use, and it must be always kept in good order to be serviceable quickly when needed. The "Hayes Extension Ladder and Fire Escape" is said to be a better appliance, but it is much more expensive and none are in use in the New York department.

Access to roofs.

All buildings are required to have some ready means of access to the roof. Skylights or scuttle frames and covers must in all cases be made of some fire-proof material, and the ladders leading to them—in order to prevent their being destroyed for fuel—are required to be of iron. The scuttle is not allowed under any circumstances to be locked, and the ladder is supposed never to be obstructed in any way so that it may be readily reached and used at a moment's notice.

Reports of fires.

Commanding officers of companies are required to send in reports of the operation at all fires. These reports give the following particulars:

1. At what time and in what manner the alarm was received.
2. What time was consumed in hitching up and getting to the hydrant; also, its location. If there was any delay state how long and its cause.

3. In what condition the hydrant was found ; also, the water pressure.

4. State what officer reported to, and what orders were received.

5. What time was consumed in stretching in and getting a stream on the fire. If there was any delay, state how long and its cause.

6. State where the pipe was taken, and by what means, stairway, ladder, &c., and at what points, and how long the stream was kept on the fire at each point.

7. Was the supply of water good or otherwise. If not good, the reason.

8. If there was any delay after the engine got to work, from bursting hose, or other accidents, state the time and cause.

9. State the number of feet of hose in line, size and style of nozzle used. Also, the highest and average water pressure at the pump of engine.

10. If hose burst, state number of lengths, kind, trademark, pounds pressure, and date of issue.

11. Total time stream on fire. Total time company on duty at fire. Time company out of quarters.

12. In the column of remarks, if first due at station, state whether the company arrived at the fire first, and was the first to get water on, and in case of any failure so to do, the reason therefor. If the fire was confined to the point of starting, and if not so confined, the reasons therefor. Under what chief officer's command the company operated ; also if accident happens, the particulars and cause.

13. On the backs of the reports, the number of officers and men that left quarters with the apparatus, and the number on duty at the fire or alarm ; the absentees accounted for by name and cause of absence stated.

Of 1785 fires which occurred in 1881, 510 were caused by heating appliances, such as stoves, furnaces, stove-pipes, flues, etc.; 440 in lighting and illuminating buildings ; 228 in manufactories by the prosecution of business, and 607 from miscellaneous causes.

260 of these fires were accidental ; 1071 arose from carelessness ; 149 were caused by defective construction in buildings ; 101 by mischievousness ; 15 from maliciousness ; 10 by incendiaries ; and in 179 the exact causes could not be ascertained.

Beams built into chimneys or under fire grates, and defectively constructed flues and fire-places caused 72 fires. Foul flues caused 185 fires, all from carelessness. Soot from chimneys and fire places igniting woodwork caused

Number and
cause of fires.

43 fires, all from carelessness. Carelessly neglected stoves, stove pipes and boilers caused 124 fires. Candles and lamps igniting clothing and bedding caused 78 fires. Gas escaping, 28. Gas lights, candles and lamps igniting window curtains and goods in shop windows caused 91, only 2 of which were accidental and 82 were from carelessness. Kerosene lamps upsetting, falling or exploding, 91 accidental and 38 from carelessness. Matches carelessly handled or left in dangerous places caused 98 fires. Sparks from chimneys, steamships and locomotives, 65. Bonfires, 27. Cigars and pipes, 127, all from carelessness. Children playing with matches, 81.

**Telegraph
Wires.**

Telegraph and telephone wires are found to be a nuisance to the fire department, as they often impede their operations and cause infinite trouble and considerable delay in elevating their ladders when time is of the utmost importance.

Water Supply.

On enquiring into the state of the water supply for fire purposes I was informed that there are large districts where the water will not flow for the greater part of the day and that the department frequently labours under great disadvantage in this respect. In no part of the city is the normal pressure of the water good or sufficient for fire purposes, so that engines have always to be called out and used from the beginning of a fire to the end. The best pressure obtainable directly from the mains is said to range from 20 to 25 lbs on the square inch, while the lowest is zero. It will be shown, hereafter, that other cities suffer in the same way, and that in Halifax even with the abundant water supply which we possess, we are steadily and rapidly approaching the same unsatisfactory state of affairs owing to the absence of any control whatever over water pipes and fittings in private premises and establishments.

In most American and nearly all European cities waste of water is regarded in the light of a crime and is punishable as such, while in this highly favored City of Halifax a citizen may with impunity lavishly waste \$1000 worth of water—or more if he has the facilities for doing so—and if, by chance, detected he can escape by the payment of one dollar, which, by the way, can seldom be collected. It is true we have an ordinance forbidding the water to be wasted and empowering the Board of Works to place meters wherever may be thought advisable, but this law is largely inoperative and does not confer the power to charge for the water consumed. While this state of things exists it is useless to complain of the low pressure in certain

districts, or to be expected that it can be made permanently better. It is not a question of the amount of water in our lakes or reservoirs, as some seem to imagine; there is always abundance there. The true state of the case is that the mains are capable of delivering only a given quantity of water in a given time under a given pressure. If the water is being consumed or allowed to run from open taps in certain districts where it will readily flow, the pressure requisite to discharge it in the given time will also be consumed, both are lost, and neither can be utilized elsewhere at the same time. This is the whole case and is the reason why the water pressure is small in some parts of this city. The only proper remedy is one of prevention, which although difficult to inaugurate is not impracticable to be carried into effect, and if prudently enforced with diligence, the effect would be at once felt, and there should be no more complaints (at least until the city more than doubles its present population) of short supply on the higher levels, or lack of pressure at the commencement of a fire when an abundant supply of water is most needed.

In the New York fire department, small chemical fire ex-
tinguishers are issued to each company, and are always kept
at their quarters in some convenient place ready for use.
The hook and ladder companies carry these on their trucks
on the forward part of the reach. The charge necessary for
an ordinary extinguisher is three pounds of bi-carbonate of
soda and one pound of acid. The charges are issued in
packages, the soda being in a tin box and the acid in a glass
bottle.

Fire Extinguishers.

The hook and ladder companies are provided with respi-
rators, by the use of which the men are enabled to enter
buildings which may be charged with dense smoke, and
where they would be in danger of suffocation without such
apparatus.

Respirators.

The following are the instructions issued by the depart-
ment for the guidance of the men in using respirators:—

“The mouth-piece at the end of the two rubber tubes of
the air-bag is introduced into and hermetically connected
at the nozzle of the elbows, which can then be quickly filled
with air by rapidly working the bellows.

“When the bag is filled with air care must be taken to
prevent its escape by bending or doubling the tubes or by
closing the mouthpiece by means of a cork.

“The bag is then placed on and fastened to the back of
the person designated to use it, by means of the straps pro-
vided for the purpose.

"The mouth-piece is inserted between the teeth, and the lips closed around it.

"The eyes are protected by glass goggles, and the nostrils are closed by a spring clip.

"The pressure on the rubber tubes must then be removed.

"The apparatus is now ready for action, the air contained in the bag being sufficient to sustain respiration for from twenty to twenty-five minutes.

Should the wearer feel his breath quickened, he will return, but without haste or fear, there being no occasion for either, as the apparatus will certainly sustain him for an additional five minutes in the most suffocating smoke."

A small rope and two whistles are furnished, which are used for the following purposes:

When a man—with the respirator—enters a building filled with smoke the rope or "life-line" is attached to the arm or wrist and is payed out by him as he progresses so as to be used as a guide on returning.

A man is stationed outside, or when practicable, at a safe and convenient place inside of the building, whose duty it is to remain in that position and hold the outside end of the life-line until the return of the man with the respirator; the line being held as tight as practicable without interfering with the movements of the wearer.

"The whistle is a rubber globe with a valve attached and is worked by pressure of the hand."

The following are the signals observed:

2 sounds of the whistle, or pulls or jerks at the life-line from without denote "*come out.*"

3 sounds or pulls denote "*I am returning.*"

4 " " "*a'll right, or I understand.*"

5 " " "*an additional respirator is required.*"

Rapid or continuous sounding of the whistle, or pulling or jerking of the life-line denotes "*I have fallen*" or "*I am fastened,*" or that immediate assistance of some kind is required.

Alarm-box keys.

The keys of the fire alarm boxes are inspected periodically when it is ascertained if each is kept in its proper place and if the locks are in good working order; changes as to location are also then made if it is thought that the keys can be lodged in better or safer custody than formerly. Company commanders are held responsible as far as practicable for the safety of alarm-box keys entrusted to private citizens, and it is their duty to see that the keys are always hung up in private houses—near the alarm boxes—in a safe and conspicuous place well above the reach of children.

The law requires that all buildings, except dwellings and churches, above two stories or twenty-five feet in height "shall have doors, blinds or shutters made of fire-proof metal, on every window and opening above the first story." When such doors, shutters or blinds cannot be put on the outside of the building they are required to be hung on the inside upon an iron frame independent of the woodwork and in such a manner that they can be opened or closed from the outside. They are all supposed to be closed on the completion of each day's business.

**Metal doors,
blinds and
shutters.**

Fire backs to chimneys are required to be not less than eight inch brick work, and in chimneys and flues "pargetting" or "parging mortar" is not allowed to be used on the inside, it being thought safer and preferable to have smooth struck joints.

**Fire backs
and flues.**

Metal flues or pipes for the conveyance of smoke or heated air within all new buildings or altered ones are required to be built in a stone or brick wall, or to be made double with the space between filled with plaster of Paris. This law seems unnecessarily stringent and it is difficult to imagine how it can practically be enforced.

Pipes.

Walls which are furred out on the inside or lathed with wood are required to have the space between the lathing and wall filled plaster between the top and underside of the floor beams of each story, so as to stop all draft and prevent fire extending rapidly from one floor to another.

**Lathed and
plastered
walls.**

Steam pipes are not allowed closer than within two inches of any wood work.

Steam Pipes.

Particulars as to the precautions taken, or rather, required by the laws relating to buildings—in order to prevent as far as practicable, accidents by fire—are too lengthy for insertion in this report; it may, however, be stated that they are very stringent in almost every detail and that the Inspector of buildings is required to make immediate report in writing of all matters of extraordinary interest or importance or needing the attention or action of the fire department.

**Precautions
to prevent
fires.**

So far as I have been able to ascertain there is no special law designating the kind or description of fire escape to be used in any particular locality. The decision rests with the Superintendent of buildings, or in case of dissatisfaction on the part of the owner a board of examiners may be appointed to view the premises and their decision is final.

Fire Escapes.

The law requires that all tenement houses over two stories in height and all hotels, boarding houses, factories, mills, offices, manufactories or workshops in which operatives are employed above the first story shall be provided with such

fire escapes, alarms and doors, as the superintendent shall direct, "and the said superintendent shall have power in determining the method of constructing the halls, stairways, ceilings, cellars, flues, furnaces, fire-places and heaters in all buildings hereafter erected in said city. And the owner or owners of any building upon which any fire escapes may now be, or may hereafter be erected, shall keep the same in good repair and well painted, and no person shall at any time place any encumbrance of any kind whatever upon any said fire escapes."

The fire escapes principally in use on buildings consist of light iron ladders or steps from the top story to the first floor. They are placed outside of the buildings, in front or rear, and as a rule at the ends of hallways, so that in case of necessity the inmates may step out of a hall window on to a light iron balcony and from thence descend by the ladders to the succeeding balconies below, which are provided at each floor. The lowest balcony is from ten to fifteen feet above the pavement and from this the people must either jump or be removed by temporary ladders, unless they can manage to escape through the burning building.

In tenement houses the balconies are sometimes made to run past each window for the whole or nearly the whole length of the building, in order to provide ready means of escape from each room.

One of the chief objections to fire escapes which consist of a light iron ladder—built almost in a vertical position in the wall of a building (as most of them are)—appears to me to be that old or timid people and particularly women and children of a timid nature, would be utterly incapable of using them, especially when required to come down from any great height!* On the other hand, however, they afford the firemen easy access to persons in danger, who—if other means failed—could in many instances be removed by life lines or ropes.

Balconies running along the face or rear of a building, with ladders from one to the other, are open to the objection that they provide ready means for the operations of burglars and as such they must create a feeling of insecurity in the minds of the inmates.

**Life-saving
corps.**

Attention has of late been aroused in New York to the advisability of creating a "life saving corps" of active and

*At the Newhall House fire, Milwaukee, Jan. 11th, a woman of middle age is reported to have been unable to come down one of these escapes. "The poor woman was so completely overcome by the horror of the situation that she was powerless to act and fell back into the vortex of fire and perished."

well-trained men, organized in somewhat the same way as in some of the large European cities, and as recently adopted in Chicago and St. Louis.

In a recent communication on this subject to the Fire Commissioners from one of their own body, it is stated: "It is an undeniable fact that occasions rarely present themselves where life-saving corps are given an opportunity of bringing their services into successful operation, because long experience has shown that where loss of life takes place in connection with fires, the loss, in most instances, occurs in the few minutes which follow the breaking out of the conflagration and before it is possible, even with the utmost speed, to render effective assistance. Still, every now and then the country is shocked by calamities such as the Potter fire and the burning of the Southern Hotel at St. Louis, where life is lost before the eyes of a multitude compelled to listen to cries for aid of the victims whom the flames have cut off. And, to my mind, one such case more than justifies the labor and comparatively small expense of organizing, training and equipping a force of men who, in addition to their other fire duties, shall be prepared in just such emergencies to bring to those whose lives are endangered every help that human ingenuity and skill can devise."

"The fact that New York has of late years witnessed the erection, in large numbers, of buildings of such immense height as to place their upper stories beyond the reach of the highest extension ladders, seems an additional reason for the general introduction of the light scaling ladders which are in use among life-saving corps, and by means of which the tops of the loftiest buildings can be safely and quickly reached."

It is also recommended that the department secure the services of a person fully competent to instruct and drill the men in the use of the appliances necessary for saving life, that suitable quarters be provided for a training school, that as the men become proficient they be sent to the various hook and ladder companies, and "that the said companies shall hereafter be supplied with the light scaling ladders, life ropes, belts, &c., essential to the proper equipment of the life saving corps."

Since the above recommendations were made, a life saving corps has been organised in the New York fire department, and on the 14th April last a public exhibition was given of what they were capable of doing in case of need.

The corps consisted of thirteen trained men. Two had coils of rope swung around them and all wore wide leather

**Exhibition of
life-saving
corps.**

belts, with pouches behind and a heavy steel spring hook in front. The apparatus consisted of about six scaling ladders and an ordinary thirty-foot ladder. The building which they were about to scale was French's Hotel. At the word of command being given, "Fireman No. 1 stepped from the line, caught up a ladder and swung it against the wall of the hotel. The iron hook passed through the window at the first story and clutched the sill securely. Up went No. 1 in a twinkling to within a few feet of the window ledge. Then the spring hook at his belt was with one hand adjusted to the ladder pole, his feet were securely planted on the rests, and his body leaned back perfectly unconstrained, and with both hands free to work. No. 2 at once passed up to him another ladder, which was adjusted to the second story window. Up this No. 1 climbed, while No. 2 scaled the lower ladder to the first floor and hung with spring hook fastened and body braced ready for the next ladder, which No. 3 passed to him, and he in turn passed to No. 1, standing ready to receive it at the second story. The new ladder adjusted at the third story window brought No. 1 up there, while No. 2 took his place at the second. And so with No. 1 receiving ladders from those behind, planting them above him and then scaling them, he ascended to the sixth floor, while his five associates swarmed up after him. Every soul was inside the topmost window in less than four minutes. They descended in half the time."

The third exercise was to place the ordinary ladder against the building and from thence to scale to the top by means of the light scaling ladders.

Rope Drill.

"The rope drill was the last. In this the ropes, which are carefully woven and soaked in chemicals to make them proof against fire, were suspended from two windows in the sixth story and hung parallel about twenty feet apart. One had a loop at the end to be fastened about the shoulders. By it the person descending was to be lowered by firemen above. The other rope was part of a contrivance by which the person descending could lower himself and regulate his own descent. The firemen who came down both ropes did so safely and rapidly." "The second part of the rope drill was quite exciting. This time the men themselves not only came down by the ropes, but each one carried a comrade along."

At scaling ladders.

The scaling ladders used were somewhat peculiar in construction. They range from twenty to twenty-two feet in length, and are made of hickory wood banded with iron. Each ladder consists simply of a pole crossed by transverse

pieces, about a foot apart, which form the steps, and a large iron hook at one end. The ladders are light enough to be handled by one man with ease, and sufficiently strong to bear heavy weights.

Sailors, carpenters and painters are said to be best suited as members of a life-saving corps, by reason of their special training in scaling to and working at great heights.

**Men suitable
for life-sav-
ing corps.**

In relation to theatres and places of amusement, the law provides that detachments of men composed of the "best, most reliable, cool, discreet and experienced men" of the department shall be upon the stage half an hour before the performance commences and remain after its close a sufficient time to make proper examination and assure themselves that all is secure from fire. They are particularly cautioned to remember that they are there on duty and not to witness the play or talk with those on the stage and that prompt instantaneous action is necessary to success in case of their services being needed.

**Places of
amusement.**

All buildings of a public character, such as hotels, churches theatres, schools, public halls, restaurants, and railroad depots are required by law to have the halls, doors, stairways, seats and aisles so arranged as to facilitate egress in case of fire or accident and to afford the requisite and proper accommodation for the public protection in such cases. "And all aisles and passageways in said buildings devoted to purposes of amusement or instruction, shall be kept free from camp stools, chairs, sofas, and other obstructions, during any performance, service, exhibition, lecture, concert, ball, or any public assemblage. The Superintendent of building is empowered to direct any work to be done on or about such buildings as may be deemed necessary in the interests of the public, such as the remodelling or alteration of halls, doors, windows, stairs, seats, aisles and escapes, so as to afford the greatest possible security to the public in the uses to which these things may be applied.

**Churches
and public
buildings.**

Whatever the cause may be there is good reason to believe that these laws—and even those relating to the construction of buildings, in the first instance—are often evaded to a very glaring extent. If the New York Sun is to be believed "there are blocks of buildings in New York that would be pulled down if the present building laws were applied to them." "There are other blocks that have been erected in the very cheapest manner and on the very verge of unlawful methods, that they will have only an ephemeral existence. They have been put up under constant protest from the department of buildings, and in some cases by sharp watching for opportunities when inspectors were

**Evasions of
the law.**

not within sight, they have been built in direct violation of law. It is an easy thing to get ready for laying the beams of a house and then seize a chance to slip them into walls without particular regard to where they strike the flues. In the case of a recent fire in an apartment house, it was discovered that one of the beams had its end directly in the flue of the furnace. It had been charring for more than a year, and when the fire broke out it was so concealed as to baffle those who were looking for the cause." Speculative building is said to be the curse of the city and the fraud is stated to begin with the foundations.

BROOKLYN, N. Y.

- The population is stated to be 650,000. Number of buildings about 90,000, and number of hydrants about 4,000.
- Hydrants.** All the hydrants are of the post pattern, with from one to three nozzles. There are 140 fire alarm boxes, at distances varying from 400 to 500 feet apart in the principal parts of the city, up to about three quarters of a mile apart in the outskirts.
- Alarm boxes.**
- Cost.** The annual cost of the fire department is given at about \$450,000.
- Fire engines, &c.** The department employs 20 steam fire engines, 5 hook and ladder trucks and 20 hose carriages. Each reel carries 600 feet of hose. Rubber hose is gradually being discarded; that made of canvas lined with rubber, being preferred, the cost of which is 93 cents per foot. For the supply of hose, tenders are called and the best samples are selected. Only fifty per cent. on the value is paid in cash on delivery. The contractor is required to maintain the hose in good condition for two years after delivery, when the balance is paid. If the hose is found to be damaged by ordinary wear and tear in that time the contractor must make good the damage or supply a new article. By the adoption of this means it is thought manufacturers will be prevented from palming off upon the department an inferior description of hose.
- Hose.**
- Equipment.** The department is equipped and managed in somewhat the same way as that in New York.
- The longest extension ladders used reach to a height of about 70 feet, above which scaling ladders must be brought into service, if needed.
- Scuttles.** The following is a copy of the law relating to "scuttles" and "fire escapes."
- "All scuttle frames or scuttle doors on every brick or stone dwelling, store, storehouse or other buildings hereafter to be erected or built within the City of Brooklyn, shall

be made of or covered with copper, zinc, tin or iron, and every window and entrance above the first story, in the rear of every storehouse over thirty feet in height to the peak or highest part thereof, from the level of the sidewalks, shall have shutters and doors thereon, made of copper or iron, or other fireproof materials, to be approved of by the commissioners. Every store, storehouse, or other building that now is or may be hereafter erected, shall have a scuttle or place of egress in the roof thereof, of proper size, to be approved by said commissioners, and shall have ladders or stairways leading to the same; and all such scuttles and stairways or ladders leading to the roof shall be kept in readiness for use at all times. Any dwelling-house now erected, or that may hereafter be erected in the city, more than two stories in height, occupied by, or built to be occupied by, two or more families on any one of the floors above the first story, and all dwelling-houses now erected or that may hereafter be erected more than two stories in height, occupied by, or built to be occupied by, three or more families above the first story, and all buildings already erected or that may hereafter be erected more than two stories in height, occupied as or built to be occupied as a hotel, boarding or lodging-house, factory, mill, offices, manufactory or workshops, in which operatives are employed in any of the stories above the first story, shall be provided with such fire escapes and doors as shall be directed and approved by the commissioners; and the owner or owners of any building upon which any fire-escapes may now or may hereafter be erected, shall keep the same in good repair and well painted, and no person shall at any time place any incumbrance of any kind whatsoever upon any said fire-escapes that may now be or may hereafter be erected in this city. Any person, after being notified by said commissioners, who shall neglect to place upon any such building the fire-escape herein provided for, shall forfeit the sum of five hundred dollars, and shall be deemed guilty of a misdemeanor."

Fire escapes.

It will be seen that no particular kind of fire-escape is designated. As a rule they are the same as those in New York, viz: light iron steps, outside of the building, from the top down to the first floor above the pavement, with a landing at a window on each story. A few Cochran fire-escapes are in use, which consist of an endless chain from the roof.

Some high warehouses and sugar refineries have light iron ladders leaded into the walls in the same manner as that at the Halifax Grain Elevator.

Water supply.

The water supply for fire purposes is better than in New York, the greatest pressure at the hydrants in the low parts of the city being about 65 lbs. on the square inch. In the highest portions, which are said to be about 130 feet above tide, the pressure does not exceed 10 lbs., while at some of the plugs it is said to range from zero to 5 lbs.

PHILADELPHIA.

Organization

The organization of the fire department is said to be the same as in New York, though upon a smaller scale.

There are about 400 firemen, 40 horses, 33 steam fire engines and 33 hose carriages, carrying from 800 to 1000 feet of hose each.

Cost.

The cost of the department is about \$450,000 per annum.

Hydrants.

The fire hydrants are all of the upright or post pattern, mostly with a single nozzle, and placed about 450 feet apart.

Alarm system.

The fire alarm system in use is not considered satisfactory, and that known as "Gamewell's System" is about to be introduced, with alarm boxes at every alternate corner. On account of the existing defects, six of the steam fire engines now turn out on the first alarm being sounded.

Hose.

No particular brand of hose is recommended, but as the department has recently purchased 10,000 feet of "Eureka" cotton hose, it is to be inferred that this kind must at least be considered as possessing some advantages over others.

Extension ladders.

Three Hayes Extension ladders are in use by the department and two more are about to be purchased. These ladders can be elevated to a height of about 85 feet, and it is said that they can be raised by men properly trained in about one minute. The department has also two Bangor ladders but they are not used, as they are considered difficult to handle.

Telegraph wires.

Telegraph and telephone wires are found to be a great hindrance to the operations of the firemen, who are now supplied with specially made cutters or pliers for cutting the wires, which by this means can be quickly cleared out of the way.

Fire escapes.

Fire-escapes are put up under the direction of a "Board of Fire-escapes." The Mayor issues notices to the owners of buildings where escapes of some kind appear to be required, but in case of objections being raised by the owners, the decision of the Board is final.

The chief of the fire department considers outside stepladders of iron with an iron landing at each floor, one of the best

and most practicable kinds of escape. Another fire-escape, lately introduced and recommended for mills and factories consists of fireproof stairways, in one or more corners of the building, completely surrounded by brick walls having no opening or communication with the interior of the mill or factory. An outside balcony is provided on the level of each floor, and ingress and egress is had by passing through outside doorways and along the balconies.

The following sketch plan will show this arrangement more fully:—



PLAN.

Although some of the patent contrivances for saving life at fires seem to possess more or less merit, the chief of the department does not recommend any he has as yet seen as suitable for general adoption. During the past summer a person interested in a fire-escape consisting of a long light canvas bag, through which it was proposed to rescue the inmates of a burning building by passing them out at a window and sliding them down to the street, gave an exhibition of one of these improved contrivances. An arrow to which a string was attached was first shot up to an upper story window and one end of the bag was then drawn up and fastened, the other end being held by men on the street. In order that there should be no doubt about the practicability of the arrangement, a young woman was induced to try this novel means of descending to the pavement below. She accordingly got into the bag at its upper end, feet foremost, but having neglected to remove her boots they cut through the canvas by reason of the rapidity of her descent, and the unfortunate woman fell out. The exhibition thus came to a sudden termination, and the patent escape was not adopted. Had the experiment been tried by sending the woman down head foremost the probabilities are that the result would not have been so disastrous, but few persons would care to undergo such an ordeal, either to prove its practicability or in case of real danger.

Water supply.

The water pressure at the hydrants is said to be good throughout the city, and varies from 20 to 150 lbs. on the square inch.

BALTIMORE.

Approximate population 400,000, number of buildings about 96,000, and about 900 fire hydrants at no regular distances apart.

Fire force.

There are 205 effective firemen in the department, 17 steam fire engines, 74 horses and 26 hose carriages carrying from 800 to 1,500 feet of hose each. The hose carriages or reels carry also two Holloway's Chemical Extinguishers which cost \$40 each.

Cost.

The department costs about \$200,000 per annum.

Engines.

On the first alarm of fire, from two to six steam fire engines are called out according to locality.

Steam is said to be always kept up in the boilers of the engines while they stand in the engine houses so as to be ready at a moment's notice. Both in Baltimore and elsewhere the "Clapp and Jones" steam fire engine seems to be held in high estimation and from all I have been able to gather it appears to be one of the best that are made.

Alarm boxes.

There are 162 fire alarm boxes ranging from three to ten blocks apart, some of the blocks being 360 feet long.

Hose.

Both rubber and fabric hose are in use; the latter is however preferred because of its being lighter and easier handled.

Hayes' Extension ladders.

The department has one "Hayes' Patent Extension Ladder and Fire Escape," and two more have recently been ordered. They are made at Elmyra, N. Y., at a cost of \$3,500 each. The ladders are capable of being extended to 85 feet in height and are said to be quickly handled by the men who are drilled in their use. In using this appliance on side hills it is found necessary to tear up the pavement in order to afford a tolerably level bearing for the truck.

The following description is taken from the official report of the Baltimore Fire Commissioners for 1881:

"The Hayes' patent truck carries seven ladders ranging from eight to forty feet in length, and an extension ladder, which is fastened to a turntable on the forward part of the truck, so that the ladder can be turned in different ways when it is being elevated, to clear the telegraph wires that it might come in contact with; and in narrow streets it can be thrown from the houses on one side of the street to those on the other side, without taking the ladder down or removing the truck. The ladder can be raised to the

height of 85 feet—a crank being used for this purpose—it only requiring four men to do it. It can be run up to its full height in less than two minutes. It is also used as a fire escape, to take people from the upper windows of tall buildings, and it has facilities for hoisting lines of hose so that they can be carried in the windows or on the roofs of high buildings. It has been tested on several occasions and worked satisfactorily."

There are 34 small chemical fire extinguishers in use, each company being equipped with two, and it is stated that over 25 per cent. of the fires have been extinguished by their use without necessitating the drawing of water from hydrants. These extinguishers were used 684 times during the year 1881 and consumed 1,026 lbs bi-carbonate of soda and 342 lbs sulphuric acid. On the sides of the shut-off-nozzles on the hose pipes there is another small pipe attached to throw a quarter inch jet of water to assist the chemical extinguishers when needed.

Large chemical engines are strongly recommended by the chief engineer of the department, who states that New York has 5, Chicago 6, Cincinnati 6, New Orleans 5, Boston 8, Buffalo 4, Detroit 2, Peoria, 2, Springfield, Ohio, 2, and Quebec 5. The reports from these cities show that from 25 to 75 per cent. of all the fires are extinguished by means of these engines alone, without the use of water, except in the form of vapor. The great advantages of their use are said to be that serious damage to goods and property—by the excessive use of water—is entirely prevented in the great majority of cases. "That a given amount of chemicals will put out four times as much fire as the same amount of water." That when a fire occurs in the roof of a building, "by making a hole in the ceiling below and putting a stream through it from the chemical engine, the gas ascends and puts out the fire, without doing any damage to the goods or furniture in the rooms below; and in confined places, such as the hold of a vessel, the carbonic acid gas extinguishes the fire much more readily than water. When large fires occur, the chemical engines are valuable auxiliaries, as they can be stationed at points to which the wind is driving the sparks, to protect property that may be in danger of taking fire from them; and the hose being light, can be carried on the roofs of buildings by two men." It is said that the engines can be run at small expense as two horses and three men are all that is required for its manipulation, and "it is the opinion of the officers in all large cities, that no department is thoroughly equipped without chemical engines."

Spray nozzles.

Spray nozzles are used by the Baltimore fire department to clear away smoke, and to work under floors when the fire is in basements.

Fire escapes.

By an act passed by the General Assembly of Maryland in March, 1882, it is the duty of the Inspector of Buildings "to visit and inspect all theatres, hotels, public halls, churches, and buildings used for public assemblages, and all manufactories employing twenty-five or more persons, for the purpose of examining whether such buildings have the proper means of exit in case of fire or panic, and if upon such examination, such buildings are found not having, in his judgment, the proper means of exit, then it becomes his further duty to notify the owner, trustee or lessee of said property to alter or improve the premises in such manner as to secure the desired object. Failure to comply with which notice, within thirty days, will subject the party not complying to a fine of one hundred dollars for neglect, and a further fine of twenty-five dollars for every day the requisite improvement is delayed."

This law, it is stated, is shortly to be amended so as to include all buildings.

Manufactories.

The chief engineer of the fire department recommends that every building used as a manufactory shall have "two scuttle holes leading to the roof, one in front and the other in the rear, with steps to them; the stairways to be stationary, and the tread of the steps to be not less than four inches; the doors of the scuttle holes to be unfastened every morning before work commences, and not closed before the employees leave the building in the evening. In buildings over three stories in height, and where more than fifty hands are employed, there should be an outside stairway, built of iron, to connect with each story, or a tower, built of brick, in the buildings, with an iron spiral stairway and iron doors to the outlets from the different floors to the tower."

Theatres, &c.

With reference to places of public amusement he says "in some of the theatres in this city there are pipes run in from the water mains, with connections for hose, and if there is hose attached, it is very apt to be old and unreliable, likely to burst as soon as the pressure is put on it, and the places to attach the hose blocked up with scenery and other stage property, so that they can not be used. A building may have a great many ways of exit, and wide stairways leading to the front doors, so that it can be emptied in a short time when there is no excitement; but when three or four thousand people are congregated together, and a panic ensues, it is quite different; everyone pushes towards the street, struggling and crushing each

other; some fall down; others fall over them, and thus the ways of exit are blocked up, and they all become a struggling, frenzied mass, and continue to crush one another until they perish."

To guard against such a calamity as is above described he recommends the passing of a stringent ordinance compelling owners of theatres and other places of amusement to provide fire alarm boxes in their buildings, to lay a sufficiently large waterpipe into the building with couplings for hose both above and below the stage and up "in the flies" on each side of the building, with hose always attached to all the couplings, with shut-off nozzles so that the hose can be laid out whenever a performance is going on, and the water turned on. That proper hooks, axes and pickaxes be kept in accessible positions on and under the stage and also that two fire extinguishers be kept up in the flies always ready for use. That two half-round knives, with twenty feet handles, be kept on the stage, to pull down the scenery and cut the ropes in case they should take fire; and that while a performance is going on, two members of the fire department be detailed to each place of amusement, one to be stationed alongside the alarm box and the other to attend to the hose. It is also recommended that all the doors be altered so as to open outwards.

To prevent accidents and loss of life in case of fire or **Schools.** panic in public schools it is recommended that outside stairways be erected as "*this is the only fire escape which can be safely used at the school houses,*" and also that each school house be connected by telegraph with the nearest engine house.

It is stated in one of the official reports that one of the **Telegraph wires.** most serious obstacles with which the firemen have to contend in the performance of their duties, is the obstruction caused by the net-work of telegraph wires above ground in the business portions of the city. When ladders have to be raised these wires cause the loss of valuable moments at the commencement of a fire, when time is of the first importance. The chief engineer says "it is a pressing necessity to devise some system for laying the wires underground, especially in business streets."

The water supply although generally good is insufficient **Water supply.** for proper protection against fire in several sections of the city. The best pressure at the hydrants is about 60 pounds on the square inch, but in some portions of the city these hydrants are at great distances apart, (but this is now being remedied,) and at other places the pressure is not sufficient to force the water up to the level of the nozzles. This state of

things is by no means peculiar to Baltimore, as will be seen by reference to portions of this report relating to the water supply of other cities, and, as was before stated, owing to the great waste of water which is tolerated in our own city, there are a few localities which are rapidly approaching the the same unsatisfactory condition.

WASHINGTON.

- Fire department.** Population about 175,000, with about 850 fire hydrants. The fire department is controlled by three commissioners and is composed of 92 officers and men, divided as follows: 1 chief engineer, 1 assistant chief engineer, 8 foremen, 6 engineers, 2 tiller men, 6 firemen, 8 hostlers, 54 privates, 3 watchmen, 1 superintendent of fire alarm telegraph and 2 operators.
- Apparatus.** The principal apparatus consists of 8 steam fire engines, 8 hose carriages, 3 hook and ladder trucks and 1 fuel wagon; 38 horses are employed, and the cost of the department is a little over \$100,000 per annum.
- Cost.**
- Companies.** The city is divided into seven fire districts. There are six engine and two hook and ladder companies. The engine companies number 10 men to each, and the hook and ladder companies 12 men each. On the first alarm of fire
- Hose.** 3 engines and from 20 to 30 men turn out. The hose-reels carry from 1,000 to 1,350 feet of hose each. The department always keeps on hand about 15,000 feet of hose in condition ready for use. All of this is fabric hose of the Paragon brand. This brand has been in use for the past six years, and is highly spoken of.
- Hydrants.** The hydrants are those known as "The McLellan Plug." They have three couplings, and cost about \$75 each.
- Alarm system.** The fire alarm telegraph system covers portions Washington and Georgetown, with 80 signal boxes, but it is recommended that 75 more be added.
- Fire streams.** The chief engineer is an advocate for a few large and powerful jets of water being brought to play upon a fire in preference to a number of smaller and weaker jets, as he considers one good stream as better than half a dozen poor ones. For this reason he seldom uses more than one stream or jet from an engine, and, whenever practicable, he concentrates the water as much as possible on any one point, putting two or more engines on to the one stream.
- Spray nozzles.** Each engine company is furnished with two of Prunty's combined cut-off and spray nozzles, which are highly recommended, especially for dispelling smoke out of rooms or

halls. They are manufactured by J. E. Prunty, 28 Light Street, Baltimore, and cost \$50 each.

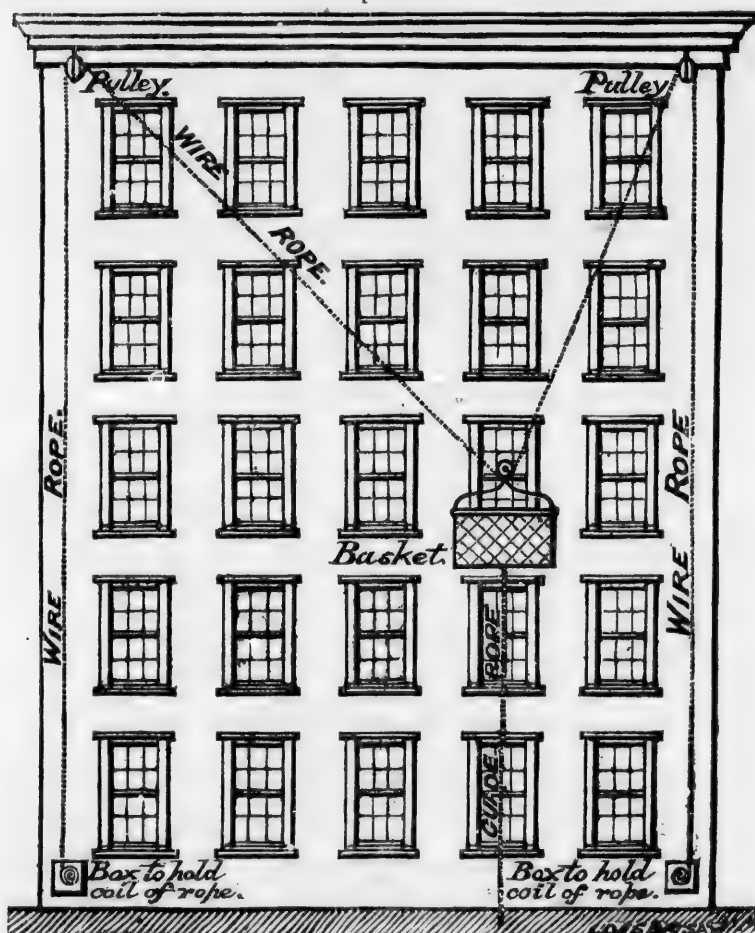
For extinguishing small fires, Johnson's hand-pumps are used in preference to Babcock or Holloway chemical extinguishers. Two of these hand-pumps are carried on each hose-reel. They are very small, light and handy contrivances, by which one man with a bucket of water can throw a jet for a distance of 30 to 40 feet. They cost only about \$8.00 complete each. **Hand pumps**

Ordinary ladders from 30 to 45 feet in length, with scaling ladders, are used by the department, which also has two extension ladders from 70 to 90 feet long. The latter are substantially the same as the Bangor ladder, altered so as to work upon platform, which can be readily detached from the wheels of the truck. The alteration is the invention of the chief engineer, Mr. Cronin, and costs about \$300. **Ladders.**

There are not many fire escapes attached to buildings in use in Washington, as the laws relating to their application are new. A few buildings have outside iron step ladders from the top to the first floor with landings on each story. The Ebbitt House has an outside ornamental spiral staircase running the whole height of the building, and also outside vertical iron ladders at the ends of the principal halls. Riggs' Hotel is provided with the "Burrows Escape" on all four sides. This invention is also termed the "National Permanent Fire Escape." After the necessary appliances were attached to the hotel a public exhibition of its usefulness was given, the following description of which is taken from a local newspaper: "The escape is very simple in construction, being composed of tackling blocks and wire rope, so arranged that it does not disfigure the appearance of the building. Upon this tackle a large basket of wire can be run from window to window on any floor of the building and to the ground in a very short time. The perfection attained by this invention in delivering a person from any window of a building to the ground in a few seconds, makes it the most efficient fire escape yet produced. The basket will hold four or five people, and in case of emergency persons can be also let down to the ground by being fastened to the ropes with belts. The apparatus works very rapidly. The experiments yesterday were very interesting and satisfactory. A little child was taken from the upper story and brought to the ground in the basket very quickly, and other persons were taken from the different windows of the building. The apparatus in case of fire would serve a double purpose, as men could be sent in the basket from the ground to any part of the **Fire escapes.**

building when it would be impracticable to use ladders. Every one seemed delighted with the experiment, and the gentlemen having charge of the apparatus received many congratulations for their success."

The accompanying cut will show more explicitly the manner of attaching and operating this form of fire escape which the Inspector of Buildings has approved of and considers the best and cheapest appliance for saving life yet invented. There are others, however, in the department who do not hold the same opinion.



THE BURROWS FIRE ESCAPE.

The chief engineer prefers fixed outside ladders with a stand-pipe attached and a nozzle for coupling hose at each floor. Firemen would thus be provided with the ready

means of reaching persons in danger, if incapable of helping themselves, and the stand-pipe would form a permanent water tower ready for use at any moment.

The building laws require the inspector of buildings to examine every building occupied as a hotel, boarding or lodging house, factory, mill or manufactory, or for offices or workshops in which persons are employed above the second story, and if, in his opinion, such building is not provided with proper facilities for the escape of persons in case of fire, he shall immediately serve a notice in writing upon the owner or owners, agent or other party or parties having an interest in said building, requiring the necessary additional facilities to be provided without delay.

Inspection of buildings.

It is stated in the Fire Commissioners' Report for 1881 that, "without a proper and ample supply of water the best drilled and equipped department in the world is powerless, and I again call your attention to the fact that, in the event of a large fire in the business section of the city, the water supply or water fixtures are not sufficient to work the full force of the department." Some of the pipes being considered too small, it is recommended to take them up and substitute others of larger diameter, and to increase the number of fire hydrants. The best pressure at the hydrant is given as about 30 lbs. on the square inch, while the lowest is zero. It is also said that in few parts of the city can a jet from a hydrant be obtained exceeding twenty feet in height.

Water supply.

MISCELLANEOUS.

It is of interest—and may possibly lead to extra precaution being taken in regard to the construction and systematic cleaning of chimneys—to note that in London during the year 1882, out of a total of 6578 calls to fires, no less than 4237 were chimney alarms, and in Paris in 1881, of 3375 fires which occurred in that year, "2114, or about two-thirds originated in chimneys, more or less poorly constructed."

Dangerous chimneys.

With regard to fires in other European cities, the "Boston Herald" is responsible for the truth of the following statements which, however, had better be accepted with a certain amount of reserve. "A fire of any magnitude in any of the continental cities of Europe is very rare. The smallest blaze is looked upon as an affair of importance, and in such a town as Heidelberg, in Germany, when an alarm is sounded, the firemen arrange themselves with as much care before responding as if they were getting themselves up for a wedding or funeral. They not only wait to put on their uniform, but they blacken their boots and indulge in a clean

Fires in European cities.

shave if their appearance is in the least rusty. Buildings in Germany, as a rule, are all fire proof, with tile roofs, tile or stone floors, walls and partitions of heavy stone or brick masonry, and stairways and halls built without the introduction of wood in any shape, there is but a slim chance for the fire fiend to get a foot hold, and much less to get under any headway. Europeans don't go to bed at night with the vague fear haunting them that before morning they may suffer the martyrdom of St. Lorenzo by being roasted alive, and it seldom happens that their own houses prove to be their funeral pyres. The property holders pay little or no insurance, and they are not taxed heavily every year to keep up an expensive fire department. Were the architects and builders to erect such combustible, tinder-box buildings as are being constructed in the United States every year by the thousands and tens of thousands, these "despotic" governments would proclaim an edict within twenty-four hours, either to cut off the architects' and builders' heads or transport them to—the United States for life. The yearly statistics, which have been carefully gathered, of the losses by fire in the United States show that they equal in value the annual cotton crop of the South! Imagine what the accumulation of wealth would be in our country if we had but the fire-proof buildings of Europe. There is no reason why New York and Boston, Philadelphia and Chicago should not be as fire-proof as Paris. To destroy the latter city by fire ten years ago, the communists found impossible, and they only succeeded in burning out the interior of some of the public buildings by first filling them with the most combustible materials, saturated with barrels of petroleum, pitch and tar. To burn up Boston it would not require these accessories; a lighted match on a windy night, thrown behind a wooden partition or ceiling, or under the wooden floors, where the carpenters have carefully hid away their shavings, is almost sure to do the work."

Paris fire department.

About seventy years ago, owing to the destruction by fire of the Austrian Ambassador's residence at Paris, and the number and high standing of the victims, the fire department was completely reorganized and placed upon an entirely military footing. The organization consisted of a battalion of firemen in four companies, composing 13 officers and 563 men, who were armed with guns. They were disciplined according to military laws and were obliged to serve the city in other capacities than as firemen. Within recent years the force has undergone many changes and its present main features are explained by the chief of the

department in a letter to the St. Louis Board of Fire Underwriters, of which the following is an extract:—

“Every fire is easily extinguished in the beginning. The aim, then, should be for the persons employed to put it out to arrive on the ground as soon as possible. To that end we have in Paris, nearly 120 posts distant, on an average, from each other 800 metres. These posts are composed of three men furnished with a hand engine, which they pull by hand, and which contains in its outfit all appliances necessary for the different kinds of fires * * *

* * * and for salvage. By the side of the hand engine and on the same truck drawn by the three men, are cloth fire buckets, a pickaxe, a ladder 12 feet long, with curved hooks at the ends and doubling in two, a large salvage rope and apparatus for cellar fires, phials of sulphate of carbon for chimney fires, a cloth for chimney fires, with which to cut off the draught, keys to hydrants, etc. The “Sapeurs” carry with them, coiled in their helmets, a small rope 75 feet long, enabling them when they are in an elevated place to draw up to them the large salvage rope. * * * Each post has, besides, a fourth man employed as telegraph operator, to report to the neighbouring fire district station the movements in detail of the first three men. If this post of three men have to deal with a fire of sufficient importance, the telegraph operator notifies the neighbouring district station of the need of aid. This district station sends immediately an officer and two more hand engines and two casks of water. The officer takes with him a more extensive outfit than that of a simple post. Each one of these hand engines is supplied like that of the small post, but it carries besides a double ladder 27 feet long, a salvage bag and a whole supply of pick-axes, fire buckets, etc. Our steam fire engines are rarely used. It is necessary to use them only when it is required to throw torrents of water to extinguish an enormous fire. This enormous fire happens, so to say, almost never; the reason of it is in the promptness of the aid, so that when a fire occurs at any point, not only the nearest post is quickly on the spot, but it is almost immediately followed by the other post adjacent to the post attacked. Generally the aid brought from the district station is useless, because the posts which have come to the assistance are already masters of the fire when the station aid arrives.”

“If there are persons to be saved, it is almost the first post which arrives that does the work. In a case where it is not possible to reach by the stairway, the apartment where persons to be saved have taken refuge, our firemen, supplied

with hook ladders, climb on the outside of the building and reach the threatened apartment. From there, by means of their small 25 metre rope, they haul up the large salvage rope, and, by means of what we call the chain knot, or, better still, by means of the cloth salvage bag, they save whoever or whatever there is to be saved in the apartment. I am able to say to you, for example, that for more than twelve years there has not been a single person burned in a room; the pompier (scalers or ladder men) being present when they knew that there were persons to be saved, and only some employes were caught on the ground floor shut in by iron gratings, upon which the strongest axe could make no impression."

**London fire
department.**

The London fire force consists of 576 men of all ranks, and the apparatus is 54 land fire engines, 12 street stations, 122 fire escape stations 4 floating stations, 3 large land steam fire engines, 38 small land steam fire engines, 78 six-inch manual fire engines, 37 under six-inch manual fire engines, 144 fire-escapes and long scaling ladders, 3 floating steam fire engines, 2 steam tugs, 4 barges, 52 hose carts, 14 vans, 13 waggons for street stations, 2 trollies, 2 ladder trucks, 49 telegraph lines, 17 telephone lines, 11 fire-alarm circuits, with 77 call points or signal boxes. Each signal box is provided with a glass front, and if a citizen wishes to send an alarm but cannot obtain the key, he is authorized to break the glass.

The chief officer of the department in his official report for 1882 states that there were 10 cases of short supply of water, 20 of late attendance of the turncocks, and 10 of no attendance at all, making altogether 40 cases in which the water arrangements were unsatisfactory.

**Principal
causes of fires**

There are many things of importance in relation to the causes of fires and the means of their prevention and suppression, to which only bare allusion has been made in this report; some have not even been referred to because they do not come strictly within the scope of my instructions.

It may perhaps be thought by some that too much space has been occupied in the description of details apparently trivial or of little concern to our citizens. When, however, it is considered that the most disastrous fires are frequently—I might almost say always—occasioned by the neglect to observe the dictates of common sense in the arrangement of trivial details, either in construction or internal arrangements of buildings and their present necessary appendages, it may be concluded—on the principle of "an ounce of prevention being worth a pound of cure"—that it would be the part of wisdom to examine into such triviali-

ties with the closest scrutiny. Matters of great moment can, as a rule, safely be allowed to take care of themselves, because they are apparent to the dullest comprehensions. The things mostly to be feared are: the beam in the flue or under the hearth; the unfilled joint in the unswept chimney; the improperly constructed elevator shaft, perhaps further bungled in some stupid alteration; the woodwork too close to the furnace or the pile of wood carelessly heaped near it; the stove pipe hole in some wooden or plaster partition; the wrongly placed gas jet; and such trivialities. Any one of these things may cause more damage in a few short hours than the whole revenues of a city for years together could repair, even if they could be devoted to that purpose.

As to fire-escapes, permanently fixed on buildings, there seems to be little need of them in ordinary dwellings up to four stories in height, because the firemen's ladders can always be brought into service in cases of extremity. Tenement houses (of which, however, we have few) need special attention, and the ordinary fire-escapes, even when affixed to them, cannot always be used when most needed. To illustrate this, the destruction on the 16th December last of a tenement house, No. 172 Suffolk St., N. Y., may be cited. The fire occurred in the day time, had it been at night, the loss of life would inevitably have been great. The outside escapes, with which the building was provided could not be approached by reason of the fire in their vicinity. The flames swept up the stairways from story to story until they reached the roof, and so rapid was their progress that the means of escape for the inmates was quickly cut off. The occupants of the top stories managed to reach the roof before the fire and thus were rescued, but for those in the lower stories the only recourse was the windows, from which they were compelled to jump.

Other buildings needing special attention are hotels, theatres and public halls, schools, manufactories, mills, asylums and prisons. In the last five it would appear judicious, in addition to whatever life-saving appliances may be adopted, to periodically drill and instruct the occupants in the quickest and best means of escaping in case of danger and so as to avoid a panic.

No fixed fire escape has yet been devised which is suited to all localities under all circumstances, and, in the nature of things, it never can be; and although preference may be given to one style of escape over another, each peculiar case must be dealt with separately. It seems superfluous to say that in all cases careful and special precautions should

Ordinary dwellings.

Tenements.

Buildings requiring special attention.

Cases must be dealt with separately.

Suggestions.

be taken to guard against accidents from fire, but as architects and builders—in designing and erecting structures—seldom give themselves much concern in this matter unless required to do so by law, and as city and town authorities are not always sufficiently informed in what is actually needed for the proper protection of life and property, I may mention a few matters, which in the public interests, ought to receive special attention in almost every community.

1. A carefully prepared act relating to the construction and alteration of buildings, containing stringent rules by which the constructors of all buildings, intended for public purposes, or for occupation by large numbers of people, can be compelled to arrange and build the stairways, passages, doors and windows in such a way as to afford the best possible protection against accidents to the inmates.

2. In connection with the above, the appointment of a skilled and competent person as Inspector, to see that the laws are properly enforced, and whose special duty it should be to examine most critically all flues, fire-places, heating apparatus, stove-pipes, and other minor matters which may be considered dangerous; with the power to enforce such alterations to be made, as he may deem necessary for the public security.

3. If there is a public water supply every effort should be made to control and check the waste of water, as this waste is productive of no good purpose whatever, and in all cases leads to the loss of pressure for fire and other purposes.

4. In connection with the foregoing rule, the enforcement of rigid laws,—relating to the inspection of internal plumbing work, the class of water-pipes and fittings which will be allowed, and the placing of these pipes and fittings—is necessary.

5. The fire force, especially if a volunteer one, should receive every consideration and aid which it is practicable to afford to it. It should, of course, as far as possible, consist of trained, able-bodied and resolute men, and it is not in the interests of the public, or conducive to the public safety to cut down the grants or allowances to the department to the lowest possible figure.

6. The fire department, besides being possessed of the most modern and best appliances with which similar bodies elsewhere are usually furnished, should have every facility offered them for reaching a fire in the shortest possible space of time, and in addition should carry with them such ropes and lifesaving apparatus as can be conveniently handled and operated by the men of the force.

Respectfully submitted,

E. H. KEATING.